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NOTES ON PEMPHIGUS TESSELATA, Fitch.

BY HERBERT OSBORN, AMES, IOWA.

SYNONOMY.

Chermes alni Kalm. Travels into North America, English translation, vol. 1, p. 154; p. 121, 2nd ed.

Eriosoma tesselata Fitch. 4th Report State Cab. Nat. Hist., N. Y.

Eriosoma tesselata Glover. Ag. Rept., 1876, p. 39.

Eriosoma tesselata (or *imbricata*) Glover, unpublished plates Homoptera iii., fig. 19.

Schizoneura tesselata Thomas, 8th Report Insects of Illinois, p. 139.

Apparently the first record of this insect is given by Kalm., as cited above, where he says under date of Oct. 3rd, 1748: "I saw to-day the *Chermes* of the Alder *(Chermes alni)* in great abundance on the branches of that tree, which for that reason looks quite white, and at a distance appears as it were covered with mold." This reference, in all probability, is to *P. tesselata*, and the reference to the European species, *Chermes alni* L., a mistake, since there are no later records of the European species being found here, and this one is specifically distinct from the one described by Linnæus.

Dr. Fitch describes the apterous female and states that he had searched in vain for winged individuals. His specimens were from *Alnus rubra.* Mr. Glover states that it was found upon Birch in Maryland. In his unpublished plates he figures the same, referring to it as *tesselata* or *imbricata.*

The newly-born larva is pale brown. The antennæ are 4-jointed, the first joint short, second one-half longer, third and terminal nearly equal and each equalling the first and second together. The dorsal portion of the body is covered with slight elevations which mark the position of the wax-secreting glands. They are arranged in rows, there being three rows on each side in the abdominal segments, except the terminal, which has

none, and the subterminal, which has two on each side. On the thorax and head they are smaller and fewer in number. Length of body 1.25 m. m.

Aptêrous viviparous ♀. "Dull bluish black; tergum with the segments marked by strongly impressed lines and covered by white down in square checker-like spots. Length 0.16 in." (4 m.m.) Fitch.

The abdomen is covered by long shreds of down, while the thorax and head are simply covered with whitish dust. Antennæ 5-jointed by division of third (?) joint of larval antenna into *two*, while the second joint has apparently shortened.

Fresh specimens of winged ♀ cleaned in alcohol are described in MS. by Dr. Hagen as "head and antennæ black, prothorax pale dirty whitish; thorax chestnut brown; abdomen pale whitish gray, above with six rows of blackish spots; beneath with four blackish fine lines on each side near the middle, not reaching the tip; legs brown; tibiæ and tarsi paler; wings opaque, veins pale, except the mediana of fore wings, which is brown. Full grown nympha is similar to the imago; the wing coverings are black."

Alcoholic specimens of winged viviparous ♀ were dark bluish black with the white filaments on the abdomen less prominent than in the apterous ♀; head and thorax covered with whitish powder. The antennæ are 6-jointed by division of the third (?) larval joint into *three*, the second joint shortening; joints 3–6 are marked with transverse irregular interruptions lined with a thin membrane, while the terminal and subterminal joints contain sensitive glands, as do also these joints in the larva and apterous ♀. Length 4–5 m.m. Expanse 10–12 m.m.

The sensitive glands of the antennæ, which may be seen in the terminal and subterminal joints, are cavities or funnel-shaped openings in the crust, which are lined by a membrane which expands in the middle into a glandular body from which arise from two to four papillæ. In some cases within the border of the cavity can be seen minute ciliæ forming a fine fringe. These organs undergo but little modification during the metamorphoses of the insect. They are prominent in the embryo taken from the viviparous female. In the adult, however, they are partially obscured by other irregularities in the surface. In the winged individuals, where the antennæ are 6-jointed, the terminal joint has at tip five short papilla-like spines, and a little below these four slightly granular elevations, immediately beneath which is an interrupted space in the

crust, and at one side of this a cavity containing a papilla; the surface of the joint is broken below this in two places by irregular interruptions in the crust, which appear to be lined by more delicate membrane. It is also somewhat roughened and thrown up in places in transverse ridges or elevations; a few hairs also pass from round openings in the crust. The subterminal joint has very near the end a large opening through the external coat, and within this three large glandular bodies which bear papillæ. Other open spaces are to be seen along the joint, but no glands. The fourth and third joints have also irregular transverse interruptions in the crust, but no papilla-bearing glands.

The papilla-bearing bodies in the last two joints must certainly be organs of sense, though I have not been able to satisfactorily show their connection with nerves. A delicate thread, probably a nerve, can in some cases be seen running through the joints, but preparations from fresh specimens will be necessary to establish its character and connections. The delicate membranous coverings of the transverse irrorations in the crust seem also well adapted to receiving impressions, but their connection with nerves is still undetermined.

The labrum is a slender conical projection beyond the clypeus from which its separation is indistinctly marked, since it contains but little chitinous structure. It is channelled on the under side to near the tip, and from this channel the setæ forming the sucking tube pass in a regular curve into the channel of the labium.

The superior setæ (mandibulæ) spring from cones which originate with chitinous arcs each side of the opening of the œsophagus; passing forward, they unite immediately in front of the hypopharynx and within the paraglossæ. The inferior setæ (maxillæ) arise from similar cones which lie beneath based upon chitinous structure lying at the superior posterior portion of paraglossal bases. They unite with each other and with the superior setæ at the union of the latter, and pass with these between and in the channel of the paraglossæ, and thence into the groove of the labrum. The paraglossæ are short and setaceous, arising from an inferior lamina which rests upon the base of the labium. The labium is *4-jointed* and reaches nearly to the end of the body in the larva, but only beyond the first pair of legs in the adult; the tip is surrounded by numerous hairs and a row of bristles extends each side of the groove. Immediately in front of the œsophageal opening appears a denser portion, the epi- and hypo-pharynx, extending to the union of the setæ, and within

this, forming a central row, are eight spots, light in the centre with dark borders, becoming entirely dark with more superficial focussing; apparently these lie immediately above the channel formed by the epi- and hypo-pharynx leading to the gullet.

In *Cicada* the epi-pharynx, which forms the under surface of the clypeus, is channelled, and the edges of channel are raised into two strong arches. In the central portion of this channel is a double row of ten spots similar to those described in *P. tesselata*, and back of these in a direct line toward the pharynx is a sac-like organ apparently with an opening into the channel and with a delicate tube leading from its neck, and within its boundaries two clusters containing four spots each, lying one on each side of the median line.* These spots are very similar to structures that I have examined which are similarly located in the honey ant, and which evidently correspond with the sense organs of the honey bee described as located here.

These organs, which seem never to have been described in Hemiptera heretofore, are present in such Hemiptera as I have been able to examine, and when fresh specimens are at hand, it is hoped that their structure and office may be more fully determined. It seems most probable, however, that they are organs of sense, and their location would warrant the belief that they may be connected with taste, though they may be connected with smell instead, or it is not impossible, owing to the close relation of these senses even in the highest animals, that they might perform a double office. The wax-secreting glands located on the dorsal surface of each segment consist of circular groups of large pavement cells disposed beneath the epidermis.

Prof. Thomas, in his work on Aphididæ (8th Rept. State Entomologist of Ill.), places this species in the genus *Schizoneura*, but following the venation of the wings according to which the genera are divided, it cannot be placed in this genus since the third discoidal vein is not forked, while in other characters, as well as this, it agrees with *Pemphigus*.

The venation, however, is not constant, for in examining the wings of over thirty specimens, one was found in which the third discoidal of the front wing was distinctly forked, while in one other the second oblique of the hind wing was forked.

* Can this structure be analogous to the "taste goblets" which are found in the fungiform and circumvallate papillæ of the human tongue?

The hooklet which attaches the hind wing to the front one is composed of five pieces side by side, like the fingers of a hand. It fits into a fold of the hind border of the front wing, which lies at the termination of the first discoidal vein.

The observations here recorded were made during the past winter in the Cambridge Museum of Comparative Zoology, while studying under the direction of Dr. H. A. Hagen, to whom I am under lasting obligations for valuable aid and for the use of material and books with which to pursue my work.

REMARKS ON THE GENERIC CHARACTERS OF THE NOCTUIDÆ.

BY JOHN B. SMITH, NEW YORK.

" I can get along very well with the Butterflies, and I know something about Beetles, but the *Noctuidæ* were always a great puzzle to me." So writes one of my correspondents, and to the same effect are expressions, both oral and written, from nearly all the collectors I have had any acquaintance with. And yet there is no good reason why the *Noctuidæ* more than the other families or groups should be considered so very difficult. True that the species are often very closely allied, and true also that there is often more difference between variations of one species than there is between valid (so considered at present) species. Yet there are many excellent characters in the *Noctuidæ*, easily recognized and readily discerned, which make the placing an unknown species into its proper genus a task of little difficulty

The truth is that the *Noctuidæ* are not so difficult a group *per se*, but the sources of information concerning it are so various, so difficult of access, and so foggy when they have been discovered, that even if the student happens to know the language in which his work is written, the information derived scarce repays the trouble bestowed upon the search. Later writers have done little to lift the veil which concealed knowledge from the eyes of others. Species there have been described in very large numbers, and genera have been created with exceeding great liberality, and the result is that the beginner is appalled at the chaos which confronts him in Entomology, and takes to Botany or some other branch of natural

science about which something seems to be known. Many of the writers of the present decade also seem to find their greatest delight in accusing those whose misfortune it is not to agree with them, of ignorance, either of the literature of the subject, or of anatomy, or something else equally heinous. A knowledge of the literature of the subject is, I admit, an accomplishment not everyone can boast of, but a knowledge of the anatomy of a Noctuid is a thing that any one can acquire in a very short time. All this has nothing particular to do with generic characters, but it was necessary to say a few words to explain why the following dissertation was written, and I will now proceed with my subject.

A good, concise definition of the group *Noctuidæ*, which shall include all the forms belonging to it, and exclude everything not so referable, is still one of the *desiderata*, and I am not able at present to supply it. As good a one as it is possible to get within a short space is the following from the preface of my synopsis of the genera :

The Noctuidæ are as a rule robust, seldom slightly built moths, with comparatively small, stiff wings, which, except in *Tortricodes bifidalis*, are entire ; the ocelli are nearly always present, and the wings have simple discal cells, two free veins at inner margin of secondaries (counted as one by the German Entomologists), and one at inner margin of primaries; the latter usually have also an accessory cell at the upper angle of the discal, sometimes separated from it by a short stalk. The antennæ are bristle-form, generally simple in the female and pectinate or ciliate in the male.

Commencing at the head, the characters used in generic divisions are as follows :

The *eyes*, as to clothing, are either entirely naked, naked and fringed above and below, and sometimes at the sides, with hairy or bristly lashes, or entirely hairy—a single hair usually arising from the angles of the facets of the compound eye. These differences have a very great generic value, and two genera separated only by one or the other of these characters would be valid.

In form the eyes are either hemispherical and very strongly convex, rounded and somewhat flattened, elongate oval, or reniform. The degree of convexity or the size have no, or only a slight, generic value, but an insect with reniform eyes would be generically distinct from a round-eyed one.

The *ocelli* are usually present, but are lacking in a few genera ; in this group lack of ocelli suffices for generic separation. When present they

are found close to the compound eye, and behind the base of the antenna. Usually they can be distinguished without denuding the head, but occasionally they are so small, and the vestiture of the head is so thick, that a part of it must be removed before the presence of the ocelli can be positively determined.

The *clypeus* is variously modified; usually it is smooth, moderately convex, and without any special peculiarity. In some cases, however, it becomes prominent, bulging out between the palpi, and this convexity has occasionally a concave depression in front, and in this depression again are tubercles, conic protuberances, etc. In other genera a conic tubercle adorns the clypeus; sometimes there is a cylindrical projection, and sometimes the projection is flattened; in one genus *(Nonagris)* bifid in front. Occasionally the "infra clypeal plate" is produced, forming a flattened shelf-like projection, usually squarely cut off before. These projections are often partially or entirely concealed by the vestiture, but can in all cases be readily demonstrated by touch with a fine pin. As to the generic value of these modifications, there is considerable difference of opinion. For my own part, I consider them as having only a slight value, and as not being sufficient in themselves to separate genera. The genus *Cucullia*, for instance, has in some species a normal clypeus, in others a convex projection, and in others a depression in this convexity. *Arzama* has in some species a conic tubercle, which is lacking in others; so that genera distinguished by clypeal differences only should be cautiously created, and no genus based on the presence, absence or form of a tubercle situated in a depression of the clypeus, should have any standing.

The *tongue* varies somewhat in consistency and length. Sometimes it is almost obsolete, as in *Cleoceris* and *Euthisanotia*, but usually it is long, strong and corneous, coiled between the palpi. Genera may be properly based on the extremes of length and consistency of the tongue, but mere variations in length do not authorize them.

The *palpi* vary greatly, and genera are very largely based on their modifications. In the typical *Noctuae* they are of moderate length, the second joint generally longest and always heaviest, and the third joint usually small and slender, and sometimes so small as to be obsolete. They are usually curved upward, closely applied to the head, and generally reach to the vertex. Sometimes they are so short as to be practically obsolete, and then again they exceed the head by half the length of the entire insect (§ *Deltoidæ*). Sometimes they are porrect and closely scaled,

having the terminal joint nearly as long as the second (*Catocala*). Sometimes, as in *Plusiodonta* and in some species of *Plusia*, the terminal joint is exaggerated, reaching far above the head. In some genera they are oblique and heavily fringed beneath, broadening toward the tip (*Basilodes*); then again they project forward horizontally, sometimes, in conjunction with the pointed frontal tuft, forming a snout (*Scolecocampa*). In *Herminia*, *Hypena* and some others, the second joint is disproportionately long and fringed above with upright scales or hair, while the terminal joint is short and slender. Sometimes they are curved upward, sickle-shaped, nearly reaching the base of the thorax and closely scaled. Mere differences in the length of the palpi or in the proportions that their joints bear to each other, do not authorize generic distinctions, if the general form remain the same; but insects having the palpi practically obsolete could not be considered congeneric with those having them well developed; nor could an insect with porrect palpi be placed with one having elongate horizontal palpi; and this in turn could not be united with one in which they were sickle-shaped and curved upward. Variations in the position of the terminal joint, whether vertical, drooping or otherwise, do not authorize a generic distinction.

The *antennæ* are very variable, but their variations do not afford good generic characters, as they are generally sexual. Usually they are simple in the ♀ and more or less pectinate or ciliate in the ♂; sometimes they are both simple, and then again both sexes have them pectinated. In some of the lower forms the males have them bunched or knotted at or below the middle, sometimes there is a tuft of hair at this point, and sometimes alone, or in addition to either or both of these distinctions, there is a decided bend, usually above the middle. Sexual characters alone should not authorize genera, and therefore the variations of the antennæ should not have a generic value.

The *clothing* of the head varies with the clothing of the entire insect, but it is sometimes modified into tufts. There is occasionally a small tuft at the base of the antennæ, and often one in front, between the palpi. Sometimes the clothing of the front is smooth and even; then again it is rough, divergent, occasionally mixed with bristles. None of these modifications alone have a generic value, but they add to the value of others, and combined with them, may attain a greater value.

The *size* of the head as a whole, varies somewhat in the sexes, and does not alone afford good generic characters, but combined with the

mode of its attachment to the thorax, it attains a higher value. The head is sometimes free, separated from the thorax by a distinct constriction, and sometimes it is closely applied to it and almost buried in its vestiture. This about exhausts the head, and it will be seen that by the variations of the head and its appendages alone, numerous divisions and subdivisions can be established, which will simplify the determination of unknown species.

The *thorax* and its appendages vary less, but even here there is a great deal of difference.

In *shape* it is usually convex, sometimes very large and heavy, rarely small; often it is somewhat depressed and occasionally quite flat; sometimes it is quadrate, but more usually rounded or ovate. Alone these variations do not present good generic characters, but combined with tuftings and the proportion the thorax as a whole bears to other parts, they afford good distinguishing features.

The *vestiture* is usually hairy, often scaly, and sometimes a mixture of both. The extremes would be generically distinct, but where the vestiture is mixed, the question is not free from doubt; ordinarily an insect with mixed vestiture would be distinct from either a hairy or a scaly one, but sometimes the mixture is so slight, or the hairy insect has the hair so much flattened, that a generic separation would be unjustifiable. *Acronycta* and *Hadena* each fall into two very well marked divisions by the character of the vestiture.

The *tuftings* vary considerably. Sometimes there are none, sometimes there is only a small acute tuft behind the collar, sometimes a divided crest or tuft in the same place, and again there may be a rounded or truncate bunch of hair. Posteriorly there is usually a larger rounded tuft, but sometimes, as in *Plusia*, it rises upward saddle-shaped, or as in *Zale* and *Homoptera*, it is divided into three diverging tufts truncate behind.

The *collar* is sometimes produced at the middle, and excavated at either side, sometimes flat, disk-like, or again, as in *Cucullia*, hood-like and exaggerated.

These modifications of tufting and collar have but a small generic value. The presence or absence of either, or the variations in form, would not indicate a generic difference, though a total absence o tufts would probably do so if there were no intermediate forms.

The *tibia* are sometimes spinose and sometimes not. This affords an

absolute generic distinction. Sometimes all the tibia are spinulated, sometimes middle and hind tibia only, and sometimes only the middle tibia; the number of tibia spinulated has no generic value. The posterior tibia has usually (if not, as I believe, always) two pairs of spurs, one pair near the middle and the other at the tip. The middle tibia have a single pair at the tip.

The anterior tibia varies greatly in shape and armature, and its modifications afford good generic characters. Usually it is proportionate, and unarmed at tip; sometimes it has spinules at the extremity, and sometimes a single strong claw; sometimes the spines and claw co-exist. Neither of these alone authorize generic distinction. Sometimes the tibia is very short, exceeded in length by the first tarsal joint and variously armed at the tip; this suffices for generic distinction irrespective of the armature. This latter is various, sometimes consisting of spines and sometimes of claws at the tip. Very often the tibia, besides being shortened, is also flattened and becomes broader anteriorly; this also authorizes separation from a genus with the fore tibia equal, no matter what its length. In a few genera the anterior tibia is almost fossorial; *Tricopis*, for instance, having a very heavy, long inner claw, and three shorter but equally heavy claws outwardly. *Tamila* has very heavily armed tibia, and in *Heliolonche* the inner claw is nearly as long as the tibia itself, and not much more slender than the tarsi. The variations in the number of claws or their length alone, do not authorize generic separation, but added to a change in the form or proportion of the tibia, they would.

The males sometimes have a brush of long hair at the inner side of the anterior tibia, but this has no generic value.

The femora vary little, and so far as I know, not at all in the American forms; in the European forms two genera have them clavate. Such a modification would support a genus.

The tarsi, so far as I know, are always spinulated. They are sometimes distinguished by long fluffy hair on the anterior and middle pair (*Eriopus*), or by long, dense, vertical, upright hair on the posterior (*Remigia*). These modifications being sexual purely, have no generic value.

The *wings* vary greatly in form and proportion. Usually the primaries are elongate, widening gradually outwardly, with rectangular or obtuse apex, slightly oblique outer margin, rounded hind angle and straight inner

margin. The secondaries are usually more or less rounded, shorter and broader than the primaries.

This is their form in the typical *Noctua*, but variations from it are numerous ; sometimes the wings are short and broad, again they are narrow and equal, sometimes lanceolate, and occasionally falcate. In one species only the primaries are divided to the middle, and this is the lowest of our Noctuids, if indeed it belongs to the group. Some genera have a tooth at the hind angle of primaries, some a slight projecting lappet, and others have this angle either rounded or excavated. Little generic value can be given to these variations, as in *Plusia* all forms of wings can be found. A lanceolate primary would however indicate a distinct genus, and the same can be said of a decidedly angulated or falcate one. A broad lappet at the middle of the hind margin would indicate a distinct genus, but a merely sinuate hind margin would not. The proportion that the wings bear to each other and to the body, have a high generic value, and genera can be safely rested on that point ; be it understood, however, that I do not mean by this that every difference in that respect authorizes a genus. The proportion must be one striking the eye at first sight, and not to be only discoverable by careful measurement.

The *venation* of the wings among the *Noctuids* varies very slightly, and the variations have been very generally considered as having an absolute generic value.

The *abdomen* varies somewhat in shape and proportion, and also in the tuftings. As to shape, it is usually more or less cylindrical, generally reaching to and often exceeding the hind angle of the secondaries ; sometimes it is cylindro-conic, as in most *Catocala*, and sometimes it is flattened, as in *Scopelosoma* and some species of *Orrhodia (Glaea)*. Its variations of form do not afford good generic characters, nor does its length, unless the proportion is exaggerated.

The *genitaliæ* of the males vary somewhat, but these variations, while affording excellent specific characteristics, have no generic value. First, because they are sexual merely ; second, because there is an insensible gradation from one into the other, rendering separation impracticable ; and third, because occasionally insects otherwise very closely related, differ very widely in this particular.

As to tuftings, these vary little in shape, being usually round bunches of vertical hair or scales, varying in number and size. Their presence or absence has no generic value, but affords good specific characters.

The foregoing includes most of the structural peculiarities of the group *Noctuidæ*, and it will be seen that there is nothing whatever in them that a student moderately familiar with the names of the parts of an insect, can not himself examine with but little trouble, and nothing requiring any higher magnifying power than that afforded by a good Stanhope lens.

PSEPHENUS LECONTEI.

BY J. GEO. GEHRING, CLEVELAND, O.

A few notes as to the habits and whereabouts of this inhabitant of the rapids of Niagara may perhaps be of interest to such collectors as may visit this locality the coming season. This interesting beetle being but rarely represented in collections, I felt induced to make extra exertions during a few hours sojourn there last August, to find it, and was finally rewarded by finding it in numbers. Although my time did not allow me to reap the benefit of my discovery, still if others are enabled to profit by these notes, the result will be the same.

By turning over the small rocks which lie in the small rapids close by the Goat and Sister Islands, the flat, crustacean-like larvæ will be found in great numbers adhering tightly to the under surface in all stages of development, and it is here one would naturally look for the perfect insect, but only to be disappointed. I spent nearly all of my time in this fruitless search, finding only *one* specimen on the under side of one of the stones, which proved to be a gravid female, and had well nigh given up in despair, when the sudden appearance and immediate disappearance of several small, shining beetles on the wet surface of a partly projecting stone aroused my attention. Every alternate wave would submerge the stone, when the objects of my anxiety would take flight, only to alight the next moment when the water retreated. After a deal of maneuvering, I succeeded in getting one, but to find that in my anxiety to get it I had crushed it hopelessly, but not so much as to prevent me from recognizing *Psephenus Lecontei*. The truth now dawned upon me that the place to look for Psephenus was not *under* but *outside* of the water, and accordingly I closely scanned the neighboring projecting stones. I soon found

the objects of my search to be perfectly at home on these projecting rocks, which were momentarily submerged by the waves, taking seemingly special delight in frequenting rocks where the current was most rapid and the swirl of the waters the strongest. It is a very active insect, and considerable dexterity is needed to take it without mutilating, the moment it alights on the slippery stones.

It would seem that it leads its matured existence entirely on the outside of the water and in the sunlight, the female only entering it for the purpose of depositing her eggs on the under side of the stones.

I am confident that any collector will be well rewarded for his trouble if he will follow the above suggestions in looking for Psephenus.

LARVA AND PUPA OF PHEOSIA RIMOSA, PACK.

BY CHAS. F. GOODHUE, WEBSTER, N. H.

Mature larva, 1.50 to 1.75 long. The body increases in size from the head to the anal segment, deeply incised between the segments. Head small and nearly round; first four segments can be retracted nearly one-half. Head and entire upper parts of body pale slate color, slightly shaded with brown on the dorsal portion. Yellow beneath between the legs, also a slight stigmatal line of the same color. Caudal horn short and black; the black extends from the base of horn to below the stigmatae. Anal shield rusty and rough; stigmatae black, encircled with yellow; abdominal feet black, the rest pale yellowish. Another specimen differs in color, being pale lavender, a slightly darker dorsal line. Under parts between the legs, a faint substigmatal line greenish yellow. Another, slightly smaller, was of a bright pea green color, with a bright yellow stigmatal stripe, in other respects like the former. The larvae are very much like those of the Sphingidae in appearance, and are exceedingly smooth and shiny. Found on willows and poplars, the last of Sept. The transformation takes place in a slight cocoon of dead leaves fastened together with a few silken threads, on the surface of the ground, much in the manner of *Darapsa myron.*

Pupa dark brown. Head case smooth, deeply incised between the abdominal segments. Anal segment large and smooth, ending in two

short points. The moth appears early in spring and is probably double brooded, as Mr. Fred. Tepper, in the Bulletin of the Brooklyn Ent. Soc., Vol. II., page 4, speaks of the moth in August.

ON CERTAIN FORMS OF NORTH AMERICAN NOCTUIDÆ, INTERESTING FROM THE STRUCTURE OF THE CLYPEUS AND TIBIÆ.

BY A. R. GROTE.

The following genera seem to fall in between *Heliothis* and *Plusia*. They appear to be distinctively American, and there is nothing like them in the European or Asiatic faunæ, so far as appears in literature. The white species inhabit the West and South-west; and the fore wings are remarkable for their lustre, the markings consisting often of black dots, in this recalling *Emydia* and certain Lithosians.

BESSULA Grote.

Vestiture hairy. Eyes naked. Front full, without excavation or tubercle, the infra-clypeal plate prominent. Tibiæ spinose, the fore tibiæ with a claw. Thorax untufted. Antennæ simple. Fore wings dull. Aspect of the Arctiid genus *Pareuchaetes*. One species from New Mexico, *Luxa*, Grote. Primaries very light and fady yellow. The t. p. line indicated by a curved series of faint ochrey dots. Two cellular dots and one or two more in place of t. a. line. Beneath costa and apices dusky yellowish. The coloring is very pale and the dotted markings tend to become lost. Consult: Papilio, I., 176.

ANTAPLAGA Grote.

Vestiture scaly. Eyes naked. Fore tibiæ with a stout claw. Front with a protuberance rising from the lower margin of a rim-like excavation jutting out from above the infra-clypeal plate. Primaries white, silky, shaded outwardly transversely with olivaceous fuscous, the dark ground color cut by the whitish subterminal line. In shape the fore wings widen outwardly, the apices are produced and the costal margin is long; the external margin very oblique and the internal margin comparatively short. One species from Colorado, *Dimidiata* Grote, Can. Ent., 9, 71.

PIPPONA Harvey.

Vestiture scaly. Eyes naked. Labial palpi short. Front full without excavation or tubercle. Thorax untufted. Cut of the wings somewhat like *Heliophila*. Fore wings satiny white, immaculate. Antennæ simple. All the tibiæ spinose; fore tibiæ strongly armed. One species, *Bimatris* Harvey, from Texas, with yellowish head and abdomen; primaries with a faint yellowish costal tinge; shaded beneath with fuscous. There are probably no "claws" to the front tibiæ, only stout spines. Consult: Bull. B. S. N. S. III., 9.

EPINYCTIS Grote.

Vestiture scaly. Eyes naked. Labial palpi short. Front full, without excavation or tubercle; the infra-clypeal plate prominent. Tibiæ non-spinose; fore tibiæ short, with a claw. Thorax and abdomen untufted. Antennæ simple. Cut of the wings somewhat like *Cucullia*. Primaries narrow and long, apices pointed; external margin oblique, even; the wings satiny white. One species, *Notatella* n. s., size of *Bimatris*, from Montana. Fore wings with two black dots on the cell. Below, on internal margin, about where the median lines might terminate, are two more. A row of black points along external margin. Else concolorous, immaculate white.

PLAGIOMIMICUS Grote.

Vestiture scaly. Eyes naked. Front with a cup-like excavation, the raised edges forming inferiorly a corneous projection above the infra-clypeal plate. Tibiæ unarmed; fore tibiæ with a claw. The tegulæ spreading away from the thorax behind with elevated terminal scales. Body untufted. One species, from New York to Texas, fuscous, with angulated pale lines and a dark sub-apical, costal triangulate patch, *Pityochromus*, Grote, Bull. B. S. N. S., I., 182.

POLENTA Morrison.

No characters are given by the author of this genus, excepting the negative one that it may be distinguished from *Schinia* by the "plain" fore tibiæ. I have shown, Bull. B. S. N. S., III., that the genus is not allied to *Schinia*, of which *trifascia* is the type; it differs throughout from that genus. It differs by having a frontal excavation, and it agrees with *Plagiomimicus* in this respect, as well as in the peculiar tegulæ and

especially in the pattern of ornamentation. *Polenta Tepperi* is a very pretty, delicate, dusky greenish species from the South, and its sole generic distinction from *Plagiomimicus*, the "plain" fore tibiae, wanting the claw, must be verified. The frontal excavation is slighter and its shape a little modified as compared with *Pityochromus*, but in their peculiar appearance the two insects are so similar that they would hardly be referred to different genera. It must be remembered that Mr. Morrison redescribes *Pityochromus* as *Schinia media*, and that it is with this species, which has a claw on the fore tibiae, that Mr. Morrison compares *Polenta*. The typical species of *Schinia, trifascia* and *rectifascia*, appear to me to have the fore tibiae unarmed.

STIRIA Grote.

Vestiture scaly. A moderate frontal excavation with a moderate tubercle near its inferior edge. Eyes naked. Legs unarmed, the fore tibiae with a stout blunt claw. The thorax is short with the extremity of the patagiae spreading and fringed with uplifted scales like *Plagiomimicus* and *Polenta*. Size large; fore wings broad with a Plusia-like tooth at internal angle. The species is rather light bright yellow, with frosted purple patches at base on internal margin and at the centre of the wing, while the terminal space and thorax are also of this darker shade. A showy species, *Rugifrons*, Grote, Bull. B. S. N. S., II., 73, from Illinois, Kansas and Colorado.

STIBADIUM Grote.

A curious moth, resembling the fuscous species of *Gortyna* in color *(necopina, nitela)*, but slighter. The wings have not the fringed tooth at internal angle of primaries as in *Stiria*, but belonging here from the shallow excavation of the front, wanting, however, the tubercle, and the unarmed tibiae, the fore tibiae with a claw. The peculiar frosted coloring also allies the moth to *Stiria*. *Spumosum* Grote, Bull. B. S. N. S., II., 74, occurs in the same localities with *Rugifrons* and in two varieties, one paler, more ochrey than the typical form.

NEW OR LITTLE KNOWN GENERA OF NORTH AMERICAN SYRPHIDÆ.

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In the preparation of a synopsis of the North American genera of Syrphidæ, I have found several new species that could not be placed in any of our known genera. A careful study of the figures and descriptions of exotic forms has not thrown much light upon them, and I am therefore constrained to regard them as new.

With the genera included in the present paper, and resuscitating Macquart's *Toxomerus*, the number now recorded from North America will reach sixty, all but five or six of which are in the writer's collection. Of these, but nine or ten have not yet been found east of the Central Plains, and the following, only, that are not now known west of that region, viz., *Triglyphus*, *Senogaster*, *Pyrophaena*, *Doros*, *Ocyptamus*, *Rhingia*, *Brachypalpus*, *Somula*, *Temnostoma*, *Merapioidus*, *Pterallastis*, *Teuchocnemis* and *Lepidomyia*, leaving nearly forty genera that occur entirely across the continent; indeed a large proportion of the species are identical from the Atlantic and Pacific regions.

Merapioidus villosus Bigot, Bul. Soc. Ent. France, 1879, No. 6, p. 64. An aberrant and well marked genus, easily recognized by the peculiar structure of the antennæ, the third joint of which is extended on its upper anterior part into an elongate cone, slightly bent forward and terminating in the thickened arista. The arista is really subterminal, showing the development of such genera as *Callicera* and *Ceria*. Body short, oval, abdomen with interrupted metallic fasciae. Its relationship is remote from *Milesia* in Schiner's acceptation (*Sphixea* Rond., Bigot.) viz., with the closed sub-marginal cell. It may be placed in the neighborhood of *Criorhina*, *Chrysochlamys*, or the following:

Brachymyia gen. nov. Head short, broad, antennal prominence well developed in the male, conic, less so in the female. First joint of antennae longer than the second, third broader than long, transversely oval. Face much produced downward and forward, conical, pointed, tuberculate, cheeks broad. Front short, eyes bare, separated in the male by the tumid ocelligerous tubercle. Body with long pile, abdomen short, broad, arched, without markings. Legs all slender, simple. Third longitudinal vein nearly straight; small cross vein very oblique, near outer third of discal cell.

Brachymyia lupina, sp. nov., ♂ ♀. Face on the sides covered with

yellowish gray pollen, with the broad median stripe and cheeks broadly shining black. Antennæ brownish black, first joint twice as long as second ; third joint somewhat reddish or brownish black. Front in the female shining black, covered with reddish or fulvous pile or hair, on the sides below pollinose. Frontal triangle in the male pollinose as on the face, the tumid ocelligerous callosity black, opaque, slightly pollinose and with a tuft of long reddish pile. Proboscis in female as long as the thorax, shorter in male. Posterior orbits below tumid, thickly pollinose and with a conspicuous fringe of yellowish white pile. Thorax black, shining, with metallic lustre and reddish or fulvous pile, longer and thicker on the scutellum. Abdomen shining black, with sparse similarly colored pile, the hind borders of the segments narrowly pollinose. Legs black, extreme tips of femora, basal third of tibiae, and basal joints of tarsi, especially the middle pair, a brownish yellow or luteous. Wings hyaline, a faint blackish shade near the tip ; near the origin of third vein a narrow indistinct brownish cross band, small cross vein also narrowly clouded ; first posterior cell closed in the border of the wing. L. c. 10–13 mm. ; l. al. 7½–11 mm Four specimens. California.

Brachymyia (*? Eriophora* Ph.) *nigripes* sp. nov., ♀. Sides of face covered with yellowish pollen, broad median stripe and cheeks shining black ; front black with black pile. Antennae black, first joint but a little longer than the second. Proboscis long. Posterior orbits fringed with whitish pile below. Thorax black, with fulvous pile in front, across the middle with black, the pleurae, scutellum, and especially the posterior angles, with lighter, yellow, and more bushy pile or hair. Abdomen black, shining ; short, broad, and arched ; the sides of the second, and all the fourth and fifth segments with thick yellow pile ; elsewhere the pile is shorter and black. Legs wholly black. Wings hyaline, a little shaded near the tip, small cross vein faintly clouded, first posterior cell closed before the border of the wing, petiolate. L. c. 14 mm.; l. al. 13 mm. Five specimens. California.

The greater, more woolly pilosity, and the conically produced face leave me in doubt as to its relationship to *Eriophora* Ph. (Ver. zool. bot. Gesell. in Wien. 1865, p. 735, pl. xxvi., fig. 36).

A third species from Maine, rather larger than the last, differs in the two basal segments only of the abdomen being yellow pilose, and the tibiæ and tarsi mostly a deep red.

Hadromyia gen. nov. Antennae situated below the middle of the

head, the antennal protuberance of moderate size. Antennae short, third joint obliquely oval, front (♀) rather narrow, somewhat arched, sides nearly parallel. Face deeply concave from antennae to tip, short, without tubercle, arched. Cheek very narrow, descending but a very short distance below the eye. Oval opening large, broad; proboscis short. Posterior orbit not tumid. All the femora very slightly thickened, simple, without spines, or protuberance. Abdomen uniformly black, broad, oval, arched. Sub-marginal cell open. Third longitudinal vein nearly straight, small cross vein quite oblique, beyond the middle of discal cell.

Allied to *Brachypalpus*, but differs in the simple unarmed femora, and the broad, short body.

Hadromyia grandis, sp. nov., ♀. Brassy black, shining. Front black, covered with gray pollen, and (except below) with short yellow pile, slightly intermixed with black at the vertex. Antennæ reddish brown, blackish toward the base. Face a dull whitish yellow, cheeks black, shining. Dorsum of thorax from in front of the wings and pleurae thickly covered with short yellow pile. Posterior half of thorax, scutellum, and first three segments of abdomen with thick, short, black pile; fourth and fifth segments of abdomen with longer yellow pile, abdomen scarcely longer than thorax. Legs black with short black pile; knees slightly reddish, anterior tibiae in front, the tips of posterior tibiae behind and anterior and posterior tarsi, with short thick golden pile; middle tarsi reddish. Wings hyaline; costal cell and stigma yellow; posterior cell petiolate. L. c. 23 mm. L. al. 17 mm. Width of head and thorax 6 mm.; of second segment of abdomen 8½ mm. One specimen. Washington Territory (H. K. Morrison).

? Brachypalpus pulcher, sp. nov., ♂ ♀. Face yellow with black cheeks, and with or without blackish or brown narrow median stripe; frontal triangle of the male yellow or fuscous; front in the female-black, rather narrow, a little broader below, yellow pollinose on the sides, pile short, fuscous. Eyes of male with enlarged facets above. Antennae yellowish brown or black, first two joints short, third obliquely oval, of a lighter color near the base below. Dorsum of thorax and scutellum black, with a bluish or partly metallic reflection; or in better preserved specimens a metallic bronze, the pile of dorsum more fulvous, on postalar callosities, scutellum and pleurae, yellow. Abdomen of a brilliant golden or bluish bronze, with short golden pile and opaque black markings as follows: first segment except the sides, second segment on the anterior

part, and a band beyond the middle of about the same width, somewhat angulated in front, third segment similar, except the anterior border may be quite narrow and the cross band sub-interrupted, fourth segment in male wholly bronze, concealing the hypopygium, in female with very narrow front border and narrow interrupted cross band; the black is attenuated on the sides, not quite reaching the lateral margins. Legs yellow, femora rather stout, anterior and middle pairs mostly brownish or black, sometimes prevailing yellow blackish above, posterior femora varying from a blackish ring near the base, to almost wholly black, below with short black bristly hairs near this end; three last joints of tarsi black. Wings smoky hyaline, stigma yellowish brown, small cross vein near outer third of discal cell. Long c. 12–16 mm., 10 specimens. Mt. Hood, Oregon; Washington Territory (H. K. Morrison).

The fasciate abdomen of this species differs from all known *Brachypalpi;* the spines below the hind femora are also quite small. Its pilosity will hardly allow it to be placed with *Xylota;* besides, the face is not so receding as in that genus. The structure of the head is very much like the preceding genus. Its resemblance to *Sterphus* Ph. (l. c.) from Chili, is quite as great.

Eugeniamyia gen. nov. Allied to *Brachyopa*, but differs in the face being tuberculate, not carinate, rather more produced and less truncate, and in the abdomen being long as in *Xylota.* There are also well developed scutellar, postalar, dorsopleural and mesopleural bristles.*

Eugeniamyia rufa, sp. nov., ♂. Red. Head and antennae yellowish red, first two joints of antennae very short, third joint sub-quadrate, arista plumose. Dorsum of thorax darker, almost brownish red, with very short black hairs, and with two rather broad pollinose stripes, abbreviated behind, and enclosing in front a black spot not reaching the suture. Pleurae with sparse yellowish white pile. Abdomen narrower than the thorax and much longer, nearly bare, shining, somewhat blackish towards the end. Legs red, basal joints of tarsi yellowish, terminal joints blackish, femora considerably swollen, with tufts of yellowish white pile below near the base, the middle and more especially the posterior pairs and posterior tibiae with sparse short bristle-like spines. Wings clouded with brownish on the anterior part, sub-hyaline behind. L. c. 14 mm.; l. a. 10 mm. One specimen, Washington Territory (H. K. Morrison).

* See Osten Sacken: "An Essay of Comparative Chaetotaxy," Mitth. d. Münchener Ent. Ver., 1881.